17th International Research/Expert Conference
"Trends in the Development of Machinery and Associated Technology"
TMT 2013, Istanbul, Turkey, 10-11 September 2013

INTEGRATED PROCESS MODEL OF QUALITY MANAGEMENT OF GLUED MASSIVE PANELS

Murčo Obućina,
University of Sarajevo
Faculty of mechanical engineering,
Sarajevo, Bosnia and Herzegovina

Sanin Hasanić,
SECOM d.o.o. Visoko
Bosnia and Herzegovina

Safet Brdarević, Sabahudin Jašarević
University of Zenica
Faculty of mechanical engineering, Zenica
Bosnia and Herzegovina

ABSTRACT

The production of solid wood panels presents the encircled manufacturing process starting from cutting of logs, steaming, drying, and technology processing to the final production of glued massive. Nowadays it presents the most vital and significant export product of wood industry in BiH.

This paper work presents the comprehensive integrated process model of quality management which contains a number of quality tools that enable the successful monitoring of production and have an influence on prediction of disturbing factors in the production of massive panels. At the same time this model links important information from the market and requirements for the final product.

This model contains tools of the quality system which partially determines certain influencing factors on the quality production that bounded together give a clear picture of integrated production process. Given model contains QFD (Quality Function Deployment), SPC (Statistics Process Control), Cause- and Effect diagram, ABC analysis all considered as tools which integrated enable the production of high quality product. As the result, the use of this model has the aim to increase productivity and quality of work and in that way to improve the competitiveness of domestic product at EU market. The critical parameters of process are isolated but monitoring them and influencing on them will give an answer on the concrete customers' requirements.

Keywords: Solid wood panels, influencing factors, quality control, process model.

1. INTRODUCTION

The quality is defined as the basis of competing advantages on the market i.e. as "harmonization with customers' requirements regarding function, price, delivery deadline, safety, reliability, environment protection, guarantee, costs, consulting, etc"[1]. In regard to that, management quality presents managing through all phases of planning, production and usage of products, all for the purpose of fulfilling customers' requirements.

On the basis of gained experience the biggest problem in the industry of massive furniture production is non-quality glued wood massive panels. The wood massive panels are products used for the production of stairs, tables, kitchen cuttings boards, etc.

The issue of clear defining requirements by the customer is extremely exposed in this area. Requirements are most often descriptively presented and the task of producer is to interpret those requirements and implement them into clear and measurable products.

Today there are more partial methods of quality management that solve this issue, but there is a problem of defining the model of quality-processing model which would comprise all production segments and provide the stability of process.
In accordance with declared aims of providing the quality in process related to the flow of material (from the raw-material to the final product), it is needed to do recognition, identification and management of influencing factors for the purpose of improving the process and blocking the appearance of non-harmonized products.

2. INTEGRATED PROCESS MODEL

The model that would be discussed in the next chapter of this work should prevent the appearance of non-harmonization and should provide feedback in order to directly integrate customers' requirements in the process of making the product.
Providing the quality by adoption of requirement standard ISO 9001 can be sufficiently enough for quality process. The principle of constant improvements states that depending on specificity of certain production type, some aspects of quality management must be emphasized and stressed more as crucial in the quality management process.

2.1. Defining the model for quality improvment

By the analysis of solid massive panels' production, we can define the image related to the quality model from the standpoint of:

- Size of manufacturing plant,
- Owner of process,
- Process it.

The size of the manufacturing plants plays a very important role in creating the picture about the producer of solid massive panels. The survey covered five biggest manufacturers in BiH and the following can be concluded from given answers:

- All companies are private properties and belongs to the category of medium enterprises,
- Regarding the primary wood processing and thermal wood treatment there are significant capacities,
- From technical-technological point of view the most modern machines are dominated which do not get behind from the technology of EU manufacturers and worldwide.

The basic aim is to present integrated process model of quality organization through the prism of processes that characterized these plants and their net with environment.
By the analysis which should include the production, supplier relations, mode of selling and relation with customers and their combination the model of actual trends can be created regarding the further improvement of the company.
With the quality model of company for production of solid massive panels all standard requirements, organizational structure, mapping of all processes, showing the link between processes and their documentation as the applying of quality tool are included which together modify this model. For its starting point, a definition, building and quality management of the product get the pre-identification of needs and expectations or recognition of those needs which have not been recognized as needs by the customer and on these bases get the creation of new needs and products. The quality of product is determined through preventive approach in the complex process of building concept for the product in the marketing, projecting and development, production and consumption taken together. This is the process which follows a dynamic game between the consumer and product.
In accordance with that, the following processes have to be emphasized for the functioning of production process of solid massive panels:

- Analysis of quality perception i.e. quality perspective by the user,
- GAP analysis,
- Defining the House of quality which will include the previous analysis,
- Defining and ranking influencing factors through the cause-and effect diagram, and
- Monitoring and collection of feedback from the production and by customers through ABC analysis and statistic process control SPC [2].

On the basis of aforementioned it is needed to define model which will include all mentioned analysis and tools.

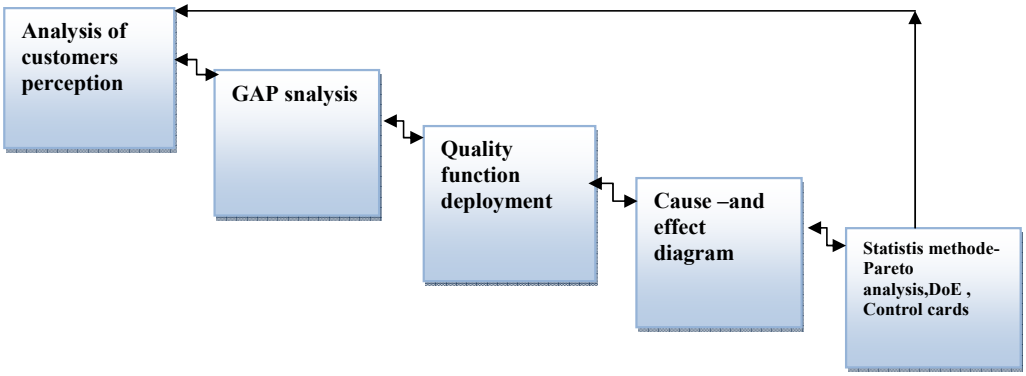

Figure 1. Integrated process model of improvement of production process quality [2].

2.2. Analysis of customer's perception

In the case of monitoring the quality function as the process model i.e. concept in which the central role is focused on the user i.e. customer, the individual customer requirements related to the product are fundamental. In this case, the quality is defined as the level of adequacy of some product for the use of certain purpose (Juran, Gryna, 1988). Since this is subjective approach in understanding the quality where differentiation comes in expectation and possible purpose of the use, the nonharmonization between what one company takes as the quality and what the customer expects to get as the quality can be caused. This concept is extremely important for wood processing industry and manufacturers of glued massive panels. Differences have been found in:

- The ordering mode of product - Agent and trade companies have agreed to make orders on the basis of established trade norms and standards, while orders toward manufactures of furniture are made according to clearly defined criteria for that company in the point of norms delivered together with orders,
- Selection of strategic instrument - Balanced scorecard and SWOT analysis selected for agent and trade companies while the Competition Analysis is most significant for the manufacturers.
- Discrepancies related to the company capacity capability – for trade companies it is very important while for manufacturers of furniture and stairs this does not play an important role.

2.3. GAP analysis

GAP analysis indicates discrepancies between the existing and desirable state and what has to be done in order to overcome the gap. In this way we can estimate our own possibilities i.e. what resources we need in order to overcome existing gap between present and desirable state. Defining the Critical Success Factors (CFS) of companies for production of glues massive panels, gained through the customers survey, we got clear requirements of customers and also defined the possible gap. Critical Success Factors are:

- High level of technical-technological capability of the company,
- Control of moisture contents of the product and raw material
- High level of raw material quality and relations and qualification of supplier and managing the warehouse,
- Production capacity
- Capacity harmonization between production units
- Assortments of products and
- Delivery deadline. [2]

With a help of the survey of customers and comparing it with the results gained from the survey of manufacturers we can say that sources of the gap can be expected in following:

- Fulfilling the requirements of customers regarding the moisture of products,
- Fulfilling the requirements of customers regarding the sufficient quantity of certain product respecting the deadline of supply,
- Fulfilling the requirements of customers regarding the persistence of quality between the supplies due to the issue of raw-material purchase,
- Fulfilling the requirements of customers regarding the product assortments, and
- Clear definition of product quality i.e. what the customer expects.

After defining the gap and the source of gap it is needed to undertake measures for correction of mistakes what we expect to get by defining the integrated process model.

2.4. Buidling the house of quality

It is important to emphasize that while collecting needed information it is needed to give answers on following questions:

- WHO are our buyers?
- WHAT do our buyers ask for i.e. expect?

The first phase of QFD process is divided into 12 steps by which fields of the quality house is filled in. During this phase, in certain steps, the value is done and correlation is given between HOW – characteristic of the product and WHAT – certain requirements of the customer.
QFD tool can serve as the basis for building the development strategy of wood industry. It is very important to have objective facts as foundation for future work. The field WHAT in the quality house should have all positive characteristic of one contemporary production which for the result has defined leader position in this branch. In the field HOW there should be given basic strategies for the future development with exact defined aims based on the characteristic from the field WHAT. Further on according the scheme of QFD the matrix of correlation and integration in the Quality house is made.
At the moment for the BiH wood industry the most important market is EU market, especially Germany. Buyers are mostly agents of big distribution houses and agents of big trade centres of furniture and big furniture manufactures who have their own branch trade net.

3. CONCLUSION

Defining the influencing factors, it is understood that there is twofold character of factors which are emphasized by customers. First are those related to the mode of production organization, capacitive capability of the company and relations with customers while the second ones are those of technical parameters which all manufacturers have to meet in order to have recognized product.
Production continuity, especially here we are talking about big order sets, enables the industry of glued massive panels and furniture in the quality management whose segments or whole production processes are repeated to focus on those phases of life cycle of product in which bigger number of nonharmonized product is noticed. Recognition of spots where higher costs are caused due to nonharmonization implies the location of spot where those costs are generated [3].
Defining the quality model – processed model which would encompass all segments of the production, the stability process is provided and especially emphasized certain aspects from the quality loop for this industry branch.

4. REFERENCES

[1] Haist, F/Fromm H. (1989): Qualitaet im Unternehmen, Prinzipien - Methoden-Techniken; Muenchen,Wien.
[2] Obučina M., Hasanić S (2012): Integrated process model for wood massive panels production, Annals of DAAAM for 2012 & Proceedings of the 23rd International DAAAM Symposium, Volume 23, No.1, ISSN 2304-1382.
[3] Buksa T.(2012): Diferencijacija upravljanja cikličnih projekata u brodogradjevnoj industriji, Doktorska disertacija, Tehnički fakultet, Sveučilište u Rijeci, Rijeka